**NBDC Site Stories**

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**NBDC Overview**

The Nile Basin Development Challenge (NBDC) is funded by the CGIAR Challenge Program on Water and Food (CPWF) to improve the resilience of rural livelihoods in the Ethiopian highlands through a landscape approach to rainwater management. The program comprises of five linked projects examining: 1) Learning from the past; 2) developing integrated rainwater management strategies; 3) targeting and scaling out of rainwater management innovations; 4) assessing and anticipating the consequences of innovation in rainwater management system; and 5) catalyzing platforms for learning, communication and coordination across the projects (CGIAR CPWF 2011).

**Key Messages**

1. Local community empowerment and leadership based on demand, equity and inclusiveness;
2. Partnerships integrating and sharing local and scientific knowledge;
3. Emphasis on learning process by all parties in a linked manner;
4. Creating incentives and risk management mechanisms for innovation and success;
5. Transforming the institutional and human capacities of all stakeholders; and
6. Adapting and using new learning and planning tools.

**History of Rainwater Management**

It is estimated that 95% of agriculture in Ethiopia is irrigated by rainwater management systems, and 80% of the flow of the Nile is fed by the Blue Nile (Abay) basin in Ethiopia.

Ethiopia and its development partners have invested more in improving rainwater and land management than any other country in Africa. In the past 30 years, there have been broad areas of investment in the Blue Nile basin focused on land and water management, though not explicitly rainwater management systems (RMS). Policies and implementation strategies have improved by adopting participatory approaches, a livelihoods focus, and an integrated watershed management paradigm. Historically, sustainable land management programs were driven from the top and there is evidence that soil and water conservation structure promoted by government were often not perceived positively by farmers. The launch of the Sustainable Land Management (SLM) Program increased government awareness of the need for productive water use, brought together allied donor and development communities for collective investment and action, and initiated a holistic approach to natural resource management (NRM). While current approaches to resource management are more participatory and community-driven than in the past, there are still challenges and limitations as programs tend to not build off of farmer knowledge and indigenous practices, be results driven rather than using monitoring and evaluation methods, not regarding rainwater in policies, weak implementation, and support of land and water management strategies (Merrey & Gebrelasessie 2011).

**Field Site Overview**

Three research sites were chosen for the NBDC based on their representation of dominant agro-ecological zones and farming systems, Jeldu, Fogera and Diga. All of the sites are mixed crop-livestock livelihoods, with approximately 30% of livelihood contribution from livestock, and 70% from crops. All of these sites experience, to some degree, pressures from high population growth, land degradation, and fragile soils (Duncan et al. 2011).

Jeldu represents a highland agro-ecological zone with a relatively low potential system and steep agro-ecological gradients. Fogera represents midland agro-ecological zone with a relatively high potential, is market oriented and a rice based system. Diga represents lowland agro-ecological zones with a relatively high potential system and poor market access, but high value crops and livestock potential (Zemadim & team 2011).

The stories of Jeldu, Fogera and Diga are aimed at exemplifying the issues faced by these woredas in the Nile Basin and how the Nile Basin Development Challenge supports interventions that empower the local community, integrate scientific and local knowledge, share knowledge among the different parties, instigate innovation and success, transform the institutional and human capacity, and adapt and use new methods for planning and learning.

**Diga**

Diga is in the East Wollega Zone of Oromiya Region and is located 343km west of Addis Ababa. It has been identified by the Nile Basin Development Challenge as a significant site for its location in the Nile Basin, and representation as a lowland agro-ecological zone with a relatively high potential system, yet poor market access but high value crops and livestock potential. It features a mixed crop-livestock farming system with a lowland-dominated agroecology (Ludi et al. 2013).

In comparison to the other sites, Diga has slightly more and less variable rainfall. Lie of a flat highland plateau. Soil is dominated by fine, well drained Nitisols. These Nitisols, also known as ‘red tropical soil’, has a stable, porous structure that permits deep rooting of plats and makes it general less prone to erosion. This soil has good internal water drainage, water holding capacity and workability. It is highly productive under a wide range of crops (Driessen and Dudal 1991). Has human-induced land degradation. Diga is the warmest of the field sites, giving it the longest growing season. Because it is located in the lower and warmer region, it is more prone to malaria incidence. Diga is less accessible to markets, though as roads are being built, the community is expected to become more accessible. Diga has the lowest population density, but highest literacy rate. Diga is located in the humid/sub-humid agro-ecological zone (AEZ). Diga has the lowest livestock density. Most cereals are sold on the market and not within the community. Diga has the least number of households utilizing advisory services, but utilization of credit services exists. Diga has relatively larger and less fragmented landholdings. Has the least amount of small-sized female-headed households. Diga is maize-based, unlike the other field sites, which are teff-based. Mango and maize are inter-cropped. State farms have been dissolved and land given to settlers (Pfeifer et al. 2012).

Recent History

The Diga woreda covers a range of altitudes, though a majority of agriculture is in the lowlands of the woreda. People moved to the lowland areas of the Diga woreda relatively more recently. The locals say the area was covered by thick forest until late 1970s and early 1980s when various population movements took place. There were population movements within the woreda as population increased and land became stressed, and forestlands were cleared for farmlands in 1982 by the community. A few years later the *derg* government moved 69 households to the locality known as Maqa Soyyama in the peasant association (PA) through its villagization program. The establishment of large state farms in the woreda by the *derg* government attracted settlers from various parts of the country. When these large farms were privatized after the change of government in 1991, former laborers on the farm started clearing forests to develop their own small farms. Moreover, through its resettlement program, the *derg* government brought in about 70 households from Wollo. After the collapse of the *derg* government the settlers brought their relatives and significantly increased in number, currently exceeding 700 household heads. Forestlands were further cleared for farming areas (Debesu 2012).

Livelihoods

Livelihoods in Diga are primarily supported by crop production, with some livestock production. Tree crops, such as mango, coffee and papaya, are important for income, as well as sesame, cattle fattening and the sell of vegetables, livestock and food crops. Community members are able to utilize local wage labor opportunities, as well as sell forest products and livestock as an income. Women and children often seek wage labor within the kebele. There is little migration for work, and of those that do migrate are often youth going relatively shorter distances (Arjo and Diga towns) compared to the other NBDC sites (Snyder 2012).

Wealth among community members is indicated by size of land and number of livestock holdings. Land holdings are often concentrated in a single area, and larger with wealthy having control over as much as 7-10 ha. Livestock is grazed on either private of communal lands within kebeles, and sometimes land is rented for grazing (Snyder 2012).

Limitations to Productivity and Coping Mechanisms

The local community has identified that farmland has become unproductive as soil erosion and termites affect both pasturelands and crop fields. The soil erosion has become a more prevalent issue as a result of deforestation and flooding, making land unproductive. Additionally, human and animal population has dramatically increased in the past decade, stressing resources. The introduction of the sesame crop has been especially harmful, as it requires completely cleared farmland for production (Debesu 2012). The community has additionally identified soil erosion as a result of lack of tree planting, deforestation, topography, overgrazing, frequent ploughing, and lack of control mechanisms, as an issue. It has been found that farmers are educated about various strategies of controlling soil erosion (Snyder 2012).

Termites have worsened the problem of land productivity by destroying crops and pastures as the land where mounds have been built become difficult to plow and grow crops. Termites have expanded in recent years as a result of declining soil fertility resulting from deforestation, degradation, overgrazing among other related factors. The expansion of the termite infestation threatens livelihoods as it leads to unsuitable grass for livestock, nectar for beekeeping, reduced crop yield and declining land productivity. Termites are even posing a threat to newly built infrastructure (Ludi et al. 2013). Traditionally, farmers have dealt with termites by burning the mounds, though the agriculture office recommends flooding as a solution, which has not been found to work as intended (Debesu 2012).

Diseases have affected income sources such as coffee and mango trees. Reports of both human and animal diseases and lack of health services are common, and unfortunately farmers have little or no control over these diseases, and receive minimal outside assistance. Additionally, there is the perception of increasing climate variability, which has been identified as another source of insecurity for farming communities (Debesu 2012).

Farmers attempt to maintain the fertility of their land using traditional and modern methods such as crop rotation, fallowing, kraaling, and the application of chemical fertilizers. However, with increasing human population and declining household livestock ownership some traditional methods such as fallowing and kraaling are becoming less practical. Moreover, the ever-increasing price of chemical fertilizer is making it impossible for farmers to use it. At one point, farmers received chemical fertilizers from the government on credit, though the government stopped fertilizer supply on credit. Now farmers are expected to purchase fertilizer with cash and farmers are concerned that fertilizer is becoming mandatory to improve the productivity of their land (Debesu 2012)**.** Because access to credit is limited in the community, livestock is used for loans (Snyder 2012).

The people in Diga have social mechanisms in place to overcome the scarcity of these resources like land, labor and oxen. Landlessness estimates are from 22-40% in Diga (Snyder 2012). Additionally, as land has become less productive as a result of soil degradation, households do not have enough land to support their livelihoods. Landlessness is a significant issue for youth as land ownership is difficult if not passed down from the family. Landlessness has triggered alternative livelihood arrangement such as land renting, migrating within the woreda for paid labor opportunities, or clearing forested land for farming (Ludi et al. 2013). To deal with this issue, there are several arrangements for sharecropping and renting land, facilitated through various arrangements, including *qixxe*, *siso*, and *kirayi* (Debesu 2012)(Snyder 2012).

Shortage of grazing areas, especially in Arjo, is a critical problem, mainly because there are no communal grazing areas. Therefore, many households set aside plots of land for pastures, which is often not more than hold a hectare and not enough for livestock feed requirement. Therefore, oxen and lactating cows are given additional feed in addition to range grazing. Oxen are fed maize powder and black finger millet, which is believed to give them energy to pull the plow. Milk cows are also given cereals of different varieties so that they produce more milk. They do not give milk only by feeding on the range (Debesu 2012).

Labor scarcity is an issue that affects all productive agriculture and pastoral activities. Traditionally, households depended on children for labor, though since children are now going to school they are not depended on for labor as much. Household that are better off are able to hire labor for more agricultural activities or may sharecrop some of their lands (Debesu, 2012). Because of limited labor, labor sharing is a common practice (Snyder 2012). Labor deficit households may depend on hired labor or *dadoo*, which is organized along both genders. Similar arrangements exist for oxen, such as *sangaa ergisaa*, *walitti hidhachu*, and *gateettii bituu*. While these mechanisms are very important, more innovative approaches also are needed to improve the lives of farmers in the face of rapidly changing environment (Debesu 2012).

Irrigation has recently become an important part of agriculture as it is stimulated by the introduction of technologies, like the water pumps, and the need to intensify agriculture as there is a shortage of farmland. The Dhapo and Maqa Rivers flow through Diga and are used for irrigation for farmlands along those rivers. There are other households that use motor pumps to irrigate their fields. Some of these individuals rent their motor pumps to users for irrigation. Owners of motor pumps are usually better off farmers who have the capital to make the purchase. Users will pay about 100 birr per farmland per use or usually enter into a sharecropping agreement with the pump owner (Debesu 2012).

Resource Management Practices

Traditionally, the farmers in Diga used different mechanisms to maintain farmland fertility, such as burning the soil. While farmers have been warned by development agents (DA) that burning destroys important soil nutrients, farmers still use these methods to destroy stables and weeds on the field that might attract termites (Debesu 2012).

Terraces have been recently used by farmers as it was required by the woreda agriculture office to install the terraces as a deterrent to soil erosion. Farmers are concerned that terraces will disrupt the grazing system as animals fed on stables after crops were harvested and now they are not allowed to enter the terraces. Hay storage is something that farmers are not accustomed to doing, though they may have to begin doing that since animals are not allowed on the terraces to eat the stables (Debesu 2012).

Additionally, farmers use methods like crop rotation, fallowing, kraaling, compost and early plowing as ways to increase land productivity. Though there are limitations to the ability farmers can use these methods. For example, early plowing is not appropriate in the relatively higher altitudes in the area before the rainy season starts because the method requires plowing the land before the return of the rains. Additionally, fallowing is becoming less used as a result of land shortage. Compost is not commonly used, though kraaling to fertilize the land with manure is used by many households. Though the amount of manure produced by a household’s small number of livestock is not enough to fertilize for than even a hectare of land, and the distribution of manure requires labor, which is already scarce (Debesu 2012).

Differences in human perceptions and experiences among community members influence actions towards forest management in a variety of ways in Diga. There is not consensus among community members whether forest conservation or forest clearance is valued. It is thought by some community members that forest clearance will drive baboons out, which pose a significant threat to crops and livestock. Though in actuality, forest clearance may exacerbate the issue. There are other community members that value the forest for its shade on coffee trees, as well as traditional and religious beliefs that support forest conservation activities (Ludi et al. 2013).

As part of its soil conservation effort, the agriculture office has already mobilized people to prepare a ground for tree planting, using a technique known as nyara, eyebrows. The technique allows the trees to get enough water from a trough-like ditch dug next to them. However, previously tree planting was unknown in the area except by those people who have coffee plantations. Coffee and sesame need different land use systems. Coffee growers often plant trees like wadessa and makkaniisa for their shade and moisture or they avoid cutting existing one. On the other hand, sesame farming requires complete clearing of the farm fields (Debesu 2012).

Community to community sharing in Diga as Harar re-settlers have introduce soil conservation practices like leaving maize and sorghum stalks on the field to avoid soil erosion during the dry season. Strip planting of vetiver grass is used to delineate degraded areas for enclosure. Coping methods include cultivating early maturing crop varieties in order to cope with unpredictable weather patterns (Ludi et al. 2013)

Institutional Organization

A Peasant Association is the lowest administrative unit of the government and ideally encompasses 500-800 households. Administratively, a PA is divided into zones (usually 3), several *garee*, and multiple *shanee*. All administrative units have leaders, who often channel government orders down to residents. While the number of households at all unit levels varies, as its name indicates, the number of households in *shanee* is five (Debesu 2012).

Needs and Potential Interventions

NBDC Vision

[Tie together key messages and how these have been supported by this particular site story]

**Jeldu**

**Fogera**

**Vision and Platforms**

**Resources**

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